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Review Article

Influence of COVID-19 On India: Challenges, Innovations, Solutions, and Outcomes

Ajay Kumar*

Ph.D. Research Scholar, School of Engineering, Indian Institute of Technology Mandi, Kamand, Himachal Pradesh, India

***Corresponding Author:** Ph.D. Research Scholar, School of Engineering, Indian Institute of Technology Mandi, Kamand, Himachal Pradesh, India

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Abstract

COVID-19 pandemic has already affected the whole world very badly. This study aims to present the challenges (healthcare infrastructure, hygiene, testing laboratories and testing kits), innovations (ventilators, virus study), solutions (medication and vaccine), and outcomes (soft power, vaccine maitri, vaccine diplomacy) regarding the novel coronavirus disease (COVID-19) in India. This study represents India's success and process to overcome the challenges of the COVID-19 pandemic. Despite initial challenges, India has converted this pandemic to an opportunity to enhance its soft power, diplomacy, and importance as a country in the world by exporting various medicines and vaccines to several countries. India has become one of the leading exporters of coronavirus testing kits, masks, medicines, and vaccines, as well as play an important role in the containment of COVID-19 disease. COVID-19 pandemic taught the importance of health, hygiene, healthy lifestyle, and technology to the whole of mankind.

Keywords: COVID-19; India; Health; Hygiene; Healthy Lifestyle

Highlights

1. Ancient medicine system (Ayurveda) of India and Yoga practice helped Indian people to boost the immunity and ultimately reduced the death rate in India due to COVID-19 disease.
2. India has started the world's biggest vaccination program from 16th January 2021.
3. India's vaccine diplomacy or vaccine Maitri helping other countries to fight VOVID-19 disease as well as helping India to enhance its soft power.
4. India has already supplied essential medicines and vaccines to more than 150 countries.
5. India has converted this COVID-19 pandemic into an opportunity to help the mankind in whole world.
6. India has plan to vaccinate the 300 million people till July 2021.

Challenges, innovations, and solutions

The vastly transmittable Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) causes the disease known as "COVID-19" [1]. The first case of COVID-19 was reported in December 2019 in Wuhan, China [1]. Covid-19 has been created chaos around the globe for more than a year now. SARS-CoV-2 has already been spread in 218 countries. By the 2nd of February 2021, it had infected more than 100 million individuals and taken the lives of more than 2.2 million humans [2]. Millions of people have already lost their jobs worldwide because of the effect of COVID-19 disease on the industries, supply chain and economy.

India is one of the most affected countries due to COVID-19. India has almost 11million cases of COVID-19 (7764 cases/million) and total death of 154,629 (111/million) by the 2nd of February 2021 [3]. As we all know, India is a developing country; however, due to the proactive effort of Indians and the Indian Government, India was able to contain the disease even better than some developed countries. Health workers of India worked very hard and selflessly to contain the COVID-19 disease, despite having the higher chances of COVID-19 disease. Indian is also one of the best performing and efficient countries regarding the containment of the COVID-19. India was most vulnerable due to the high population (almost 1.4 billion) and low hygiene practices. Initially, the people of India face some issues related to the supplies of food and other essential commodities; however, the Government of India (GOI) make sure the uninterrupted supplies of essential commodities as well as launched several food schemes for the free food in villages. Continuous lockdown, including several phases of almost four months, was one of the key reasons to restrict the spread of COVID-19 on a massive scale. This was enough time for India to prepare for the management of COVID-19. World's largest, 10,000-bed Sardar Patel COVID Care Centre and Hospital (SPCCCH) were developed in India at Radha Soami Satsang Beas in the Chhatarpur area of the national capital (Delhi) in the record time of ten days. SPCCCH worked as the isolation center for mild and asymptomatic COVID positive patients. One of the major challenges was the availability of very few laboratories in India to test COVID-19. The Indian Council of Medical Research (ICMR), Ministry of Health and Family Welfare (MoHFW), GOI started to expand the scale of testing, and now India has more than thousands of laboratories to test COVID-19.

The second task to available the sufficient numbers of the ventilator in all government and private hospital in a short span of time as well as upgrade the existing system and make that able to diagnose the people with COVID-19 disease. This was one of the most challenging tasks; the Indian Government started the charity program "Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund" (PM CARES fund) [4] to purchase the ventilator as well as started the make in India program for ventilators. Coronavirus testing kit was very less in India initially (March 2020); however, in January 2021, India can produce more than a million kits per day and has become one of the major exporters of coronavirus testing kits. The Indian state and central government also announced several food and money relief packages to farmers, daily wage laborers, and poor people in India [5]. The state and central government of India started several traveling plans for laborer people so that they can reach their places. Several causalities were also happened in the lockdown period in India due to misinformation.

While most people who become infected with COVID-19 disease are asymptomatic or have mild symptoms; hence, one of the major challenges in India was also the contact tracing of People due to the huge population. Therefore, one mobile app named "Aarogya Setu" was developed for contact tracing of people in India [6]. Aarogya Setu is an Indian COVID–19 "contact tracing, syndromic mapping, and self-assessment" digital service, primarily a mobile app, developed by the National Informatics Centre under the Ministry of Electronics and Information Technology (MeitY) India [6]. The app reached more than 110 million installs in 40 days in India. Now people of India have understood the importance of hygiene, health, a healthy lifestyle, and technology to counter the COVID-19 pandemic. The GOI was successful in conveying the danger of COVID-19 and its consequences. Ayurveda medicine plan and YOGA practice were enhanced in India to promote a healthy lifestyle as well as to boost the immunity system. Ministry of AYUSH (The Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy) has also suggested several indigenous alternative medicines in India to boost the immunity to prevent the COVID-19 disease. Online classes, coaching, and conferences have taken the place of the traditional education system in India.

As we all know that India is known as the pharmacy of the world. Indian Doctors, Scientists and Researchers were worked very hard to prepare an indigenous vaccine. India is now ready for the production of two vaccines in India. One vaccine is Indigenously developed by Bharat Biotech, ICMR, and National Institute of Virology Pune (NIV Pune), named as "COVAXIN" [7] and the other was jointly developed by AstraZeneca, Oxford University and its spin-out company, Vaccitech, named as "COVISHIELD" in India. COVISHIELD will be mass-produced (more than a billion doses) by Serum Institute of India [8], Pune, India (Serum Institute of India is an Indian biotechnology and pharmaceuticals company, and it is one of the world's largest vaccine manufacturer). COVID-19 is not over yet; the reports of new mutation or a new strain of coronavirus are regularly coming. Several studies indicated that the COVID-19 patient found to have less load to fracture; thus, COVID-19 disease

increases the chance of bone and joint fracture [9-13]; however, several recently published studies show the predicted location of the fracture in the bone and joint [14-18]; therefore, these studies would be helpful to prevent the bone and joint fracture. However, the people are more aware now, and hopefully, we will win this battle with COVID-19 soon. Factors associated with COVID-19 can be seen in figure 1.

Figure 1: Representation of challenges, innovation and solutions associated with COVID-19 disease.

India has now started the world's largest vaccination program constituting three phases from 16th January 2021 on more than three thousand vaccination centers. The vaccination program prioritizes healthcare and frontline workers, and then those over the age of fifty or suffering from certain medical conditions. The first phase of vaccination is for the healthcare and frontline workers (almost thirty million people of India); the second phase of vaccination is for elderly people and the people with some medical conditions (almost three hundred million people of India) and the final and third phase of vaccination includes the whole remaining population of India. Drug Controller General of India (DCGI) approved the two vaccines, "COVISHIELD" and "COVAXIN," for emergency or conditional use in the vaccination. However, the approval of "COVAXIN" was met with some concern as the vaccine had not then completed phase-3 trials. India has helped so many countries to contain the COVID-19 disease as well as export the medicines to several countries. India has also promised to gift and sell the vaccine doses to its neighbors, friendly countries, and several other developing countries, i.e. Brazil, Bangladesh, Nepal, Bhutan, Maldives, Myanmar, South Africa, etc.

Conclusion

Being a developing nation and a country with a high population (almost 1.4 billion), India has faced several issues/challenges regarding the COVID-19 disease. However, the Doctors, Scientists, and Researchers of India create the innovations and provide solutions to the COVID-19 disease. The following conclusions can be made from the current study:

1. India has fought well to tackle the challenges generated due to the COVID-19 disease; however, India still needs to develop and upgrade the healthcare infrastructure to tackle these kinds of disease in the future.
2. India has started the world's largest vaccination program as well as started to export the vaccines to the neighbouring and other countries. This shows India's commitment to helping mankind as India believes in "Sarve Bhavantu Sukhinah Sarve Santu Niramaya". Therefore, it will increase the importance, diplomacy, and soft power of India as a strong and civilized country.
3. India has already exported the essential medicines and vaccine to the around 150 countries in the world to fight against COVID-19 disease.
4. Timely vaccination in India will boost the morale of the Indian people and shows the ability of India to tackle the COVID-19 pandemic.
5. The vaccination program of India will boost the economy of India.
6. COVID-19 pandemic has surprised the whole world, and India is no exception to that; therefore, India should expand its medical facilities to tackle this kind of pandemic more quickly in the future.
7. The people of India have become more aware and committed to taking extensive precautions to contain the COVID-19 disease.

8. Ancient medicine system (Ayurveda) of India and Yoga practice helped Indian people to boost the immunity and ultimately reduced the death rate in India due to COVID-19 disease.

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Conflict of Interest

Ajay Kumar declare no potential conflict of interest.

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